



# Peninsula Corridor Electrification Project Cost / Schedule Update

Board of Directors  
November 6, 2014  
Agenda Item 6



## Context

- Caltrain/high-speed rail blended system
  - Primarily 2 track system
  - Minimize impacts
  - Shared system
- ➔ • HSR early investment strategy
  - Advanced Signal System (CBOSS PTC)
  - Peninsula Corridor Electrification Project
- Blended System (additional improvements)
  - Downtown SF extension
  - Core Capacity Improvements



## Funding Partners

- 9-party Regional Funding MOU (2012)
- \$1.5 billion
- Partners
  - CA High Speed Rail Agency
  - Metropolitan Transportation Commission
  - Peninsula Corridor Joint Powers Board
  - San Francisco
  - San Francisco County Transportation Authority
  - San Jose
  - Santa Clara Valley Transportation Authority
  - San Mateo County Transportation Authority
  - Transbay Joint Powers Authority

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## Summary

Program	Based on MOU	Update
CBOSS PTC	\$231M (Contract)	\$231M (Contract)
Electrification Project	\$1,225M (2008) Revenue Service 2019	\$1,474M - \$1,531M (2014) Revenue Service Winter 2020 – Spring 2021
<b>Total</b>	<b>\$1,456M</b>	<b>\$1,705M - \$1,762M</b>

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## Partner Discussions

- State Support / MTC Leadership
- Funding Ideas
  - JPB Financing / TIFIA Loan
  - JPB Fare
  - Regional Measure 2
  - State Cap & Trade
  - FTA Core Capacity
  - FTA Vehicle Replacement

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## Electrification Project

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## Key Elements

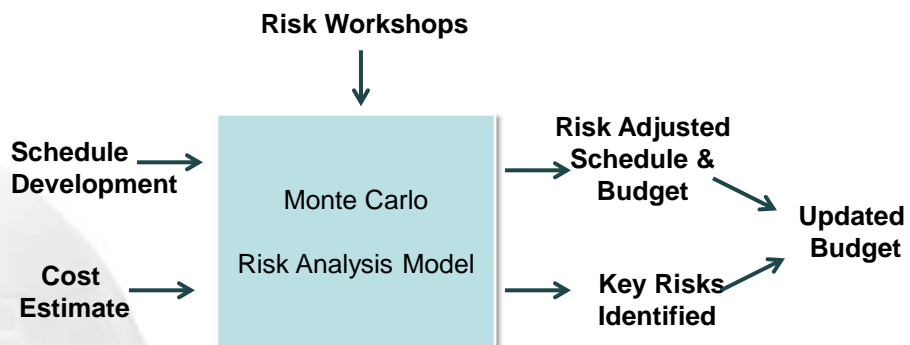
- 51+ miles corridor electrification
- ~75% diesel vehicle to EMUs (96)
- 2040 ridership forecast: 100,000 (weekday)
- More service / improved performance
  - Restore service
  - Increase peak and non-peak service
  - More station stops/reduced travel time

## Process / Method

## Update Approach

- Detailed analysis of project affect on customers
- Consideration of reliability of service with aging fleet
- Efficient cost-effective construction process
- Changes in cost factors since 2008 cost estimate

## Reexamination Process



# Integrated Program Schedule

# Schedule Scenarios

Scenarios	Schedule Assumption	Non-peak Headways	Revenue Service Date	Variance
A	<b><u>Worst Case</u></b> - OCS installation performed in geographical sequence - Most restrictive work windows with restriction on long zones, 54-hour weekend single track - Initial Design Durations	60-minute Headways	December 2024	+\$340M
B	<b><u>Changes to establish base line schedule</u></b> - Split into 4 work areas for OCS installation with restriction on 8 long zones, 54-hour weekend single track with extensive blackout periods - Revised Design Durations by 12 months	60-minute Headways	February 2023	+\$232M
C	<b><u>Refinements to base line schedule</u></b> - Concurrent work areas, 54-hour weekend single track with less stringent blackouts limited to pre- through post-event times, restricted 8 long zones - Revised workflow sequence to get to Segment 4 testing sooner breakout of testing by segment	60-minute Headways	July 2022	+\$230M
D	<b><u>Refinements to Scenario C</u></b> - Segment boundaries modified to balance OCS workflow - Remove restriction on 8 zones with 90-minute headway - Further refinements to testing - Revision to OCS procurement duration by 6 months	90-minute Headways	April 2021	Baseline

## Electrification Work Segments



- Segment Boundaries
  - Segment 1 (MP 0.2 to MP 8.0)
  - Segment 2 (MP 8.0 to MP 29.1)
  - Segment 3 (MP 29.1 to MP 44.5)
  - Segment 4 (MP 44.5 to MP 51.1)
  
- Work Direction
  - Two concurrent, not adjacent work areas
  - Working south to north starting with segments 4 and 2

## Schedule: Scenario D

ACT DESCRIPTIONS	Y	2014				2015				2016				2017				2018				2019				2020				2021			
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4				
<b>PCEP with EMU</b>																																	
1 Environmental Planning																																	
2 Permit and Approvals																																	
3 DB Procurements and Award																																	
4 Design/Engineering																																	
5 Material and Equipment Delivery																																	
6 Vehicle Manufacturing and Delivery																																	
7 Construction/Installation																																	
8 Testing and Start Up																																	
9 Operational Readiness Phase																																	
10 Revenue in Service																																	

<b>Start OCS Construction</b>	<b>March 2016</b>
<b>EMU Pilot Train Set Delivered</b>	<b>September 2018</b>
<b>Last EMU Delivered</b>	<b>July 2020</b>
<b>Revenue Service Date</b>	<b>April 2021</b>

# Contingency Analysis

## Contingency Analysis: Method 1

Top 10 risks of 205 identified in Monte Carlo analysis shown below with a total of \$70M within a calculated risk contingency of \$168M.

Risk	Expected Value
TASI support and coordination (track access)	\$21.8M
FTA requires ADA compliance at all stations	\$10.5M
Risk associated with start-up and testing with operating system	\$9.38M
Impact of electrical load flow study on traction power system	\$4.95M
General impact of UPRR agreements	\$4.95M
Increased tunnel modification costs	\$3.75M
Delay of CBOSS / PTC Revenue in Service of 12-31-15	\$3.75M
Inefficient sequencing of OCS construction due to access constraints	\$3.75M
Insufficient time for integrated testing	\$3.75M
Complex Agency internal review and decision making processes	\$3.75M





## Contingency Analysis: Method 2

Contingency calculated on individual program components with a total of \$152M with \$106M for Electrification and \$46M for vehicles.

Element	Contingency
OCS/TPS (15%)	\$53M
Vehicle cost (10%)	\$46M
Signals (20%)	\$22M
Communications (15%)	\$1M
Utilities (15%)	\$1M
Environmental (15%)	\$4M
Real Estate (20%)	\$6M
TASI Support (20%)	\$12M
Owner's PM/CM (10%)	\$8M

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## Electrification Component Cost Update

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## Electrification Estimate Basis

- Total re-evaluation of 2008 cost estimate
- Quotes from manufacturers
- Productivity rates from like projects in the North East Corridor
- Labor adjustments for night work/active railroad/type of work
- Local labor rates
- Industry standards
- Revenue service date April 2021
- 3% annual escalation

## Electrification Project Elements

Program Element	\$ Estimate
Contractors includes DB Incentive	\$628M
Utilities, Real Estate, TASI	\$103M
Owner's Management Oversight	\$100M
Contingency	\$106M
Previous Electrification Project Phase Actuals	\$21M
<b>Total</b>	<b>\$958M</b>

Note: \$785 million (2008)

## Electrification Cost Drivers

Description	\$ Change
Wayside Signal (Escalation and Scope)	+\$85M
TPS (Escalation)	+\$45M
OCS ( Escalation)	+\$75M
Environmental Mitigation & Real Estate (Scope)	+\$40M
Communication (Scope decrease)	-\$15M
Contingency, Escalation, Owner's Costs (Reallocation)	-\$87M
Power Control Center, CEMOF, Incentives	+\$30M
<b>Net Variance</b>	<b>+\$173M</b>

## Electrification Scope Reduction

Schedule: From April 2021 to December 2020

Considerations	
Eliminate Electrification of UP MT-1 and Controlled Siding, from Santa Clara to south of Tamien	\$13.0M
Eliminate Electrification beyond Michael Yard south of Tamien	\$5.3M
Revise Design Concept to shared pole foundations for Guy-Wires	\$5.5M
Reduce Owner's Oversight resulting from above reductions	\$3.8M

## Electrification Scope Change

Considerations	
Defer Electrification of Michael Yard south of Tamien	\$ 5.0M
Defer Electrification - San Francisco Yard – all storage tracks	\$ 1.8M
Reduced Owner's Oversight based on deferral of above	\$1.2M

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## Funding Partner Considerations

- Increase escalation from 3% to 3.5% to 4%:
  - Recommend no change
  - Local escalation has been less than 3% for past 5 years
- Add management reserve:
  - Change made and included in cost estimate
  - Add 3% (\$28M)
- Increase weekend shutdowns from 3 to 30
  - Recommend no change
  - Change would result in reduction in schedule by less than one week with negligible change in cost

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## Summary

Schedule	April 2021	December 2020
<b>Program Elements</b>	<b>Base</b>	<b>Adjusted</b>
Contractors includes DB Incentive	\$628M	\$597M
Utilities, Real Estate, TASI	\$103M	\$103M
Owner's Management Oversight	\$100M	\$95M
Contingency	\$106M	\$106M
Previous Electrification Project Phase Actuals	\$21M	\$21M
Management Reserve	\$0M	\$28M
<b>Total</b>	<b>\$958M</b>	<b>\$950M</b>

## Vehicles (EMUs)

Based on in-service  
bi-level EMU with 25" floor threshold



## Vehicle Elements

Program Element	\$ Estimate
Vehicle Manufacturer 96 vehicles	\$458M
TASI	\$4M
Owner's Management Oversight	\$65M
Contingency	\$46M
<b>Total</b>	<b>\$573M</b>

Note: \$440 million (2008)

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## Vehicle Cost Drivers

Description	\$ Change
Vehicle Cost	+\$118M
Test Equipment and Spare Parts	+\$12M
Mock up	+\$1M
CBOSS PTC	+\$3M
Contingency, Escalation, Owner's Costs	-\$5M
TASI and Commissioning facility	+\$4M
<b>Net Variance</b>	<b>+\$133M</b>

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## Vehicle Scope Reduction

Considerations	
Defer purchase of one 6-car (EMU protect) train set for North Terminal / Off set need by purchase of 3 used electric locos	\$20M
Reduce amount of spare parts plus test equipment from 10% to 5% (Incorporate balance of spare parts into separate maintenance contract)	\$21M
Reduce staff support costs associated with EMUs	\$ 8M
<b>TOTAL EMU CONSIDERATIONS</b>	<b>\$49M</b>

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## Vehicle Program

Program Element	Base	Adjusted
Vehicle Manufacturer	\$458M	\$415M
TASI	\$4M	\$4M
Owner's Management Oversight	\$65M	\$57M
Contingency	\$46M	\$46M
<b>Total</b>	<b>\$573M</b>	<b>\$524M</b>

Note: Funding partner consideration to add management reserve – not recommended given current vehicle pricing

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## Next Steps

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## Key Tasks

- Certify FEIR
- Complete analysis of cost reduction measures
- Conduct shared platform analysis/conclude decision on future boarding height
- Update funding plan
- Recommendation to JPB
- Issue Electrification DB RFP and Vehicle RFP

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## Shared Platform Analysis

- Current approach
  - HSR at 50" / Caltrain at 25" boarding height
  - Dedicated platforms at 3 – 5 stations
- Consider alternative vehicles to achieve same boarding height
- Key Considerations
  - Trade offs (ex. capacity, performance, operations)
  - Compatibility with current 8" platform
  - Compatibility with existing diesel fleet (interim period)
  - Compatibility with existing tenants and freight
  - Regulatory CPUC and ADA requirements
  - Station modifications with 50" versus 25" platforms

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Q/A

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